

SUBSCRIPTION for 1980 is \$10. Now that this issue is out, the address label program will be reset to zero, so take heed. We have started to translate the HANDBOOK (page shown on p.83) so those outputs will take prominent positions in next year's issues. And there will be material on utilization of the keyboard/memory unit I'm having developed. Plus programs and who knows what?

REVIEWS of 'commercial' programs start in this issue with a comprehensive output by Dick DeForest. We have received a suggestion that it might be useful to some to have reviews of the Bally games. As the Bally distribution shrinks, mail order becomes the mode of purchase. Prospective purchasers would like to know the worth of the Bally outputs, and if anyone could review these, it would be a service to those distant from a dealer.

SOUTHERN INDIANA subscribers are urged to contact Dave Stocker or Guy McIlmore 479-7336 if they are interested in a local user group.

ASCII KEYBOARDS have been successfully interfaced to the Bally Arcade, report two subscribers. In brief, these keyboards replace cassette tape as the BASIC input source. The schemes differ slightly in that one of them (Jerry's) has simulated the Kansas City Standard in order to transfer the ASCII keyboard data, and the other (Ed's) bypasses the Kansas City Standard phase and provides a serial data stream from the ASCII keyboard to the audio cassette adapter. Both schemes require some audio cassette hardware modifications as well as some circuit assembly.

They both provide the look and feel of keyboard input for all except Basic "Key" words (LET, FOR, etc.) These key words are generated from the ASCII keyboard by depressing a lower-case alpha character (e.g. PRINT is entered by typing a lower-case t).

For further information, contact the authors directly:

Jerry Tindle

Edmund Mulholland

8414 Staunton

Route 4, Box 424 H

Austin TX 78758

N.Wilkesboro, NC 28659

The above was written by Tom Wood, based on data submitted by Jerry and Ed.

ANOTHER NEWSLETTER? You will note an ad by Fred Cornett who is proposing a new source of information for the Bally. We certainly need all of the software we can get, for review and analysis of the techniques used in a program is a self-improvement scheme. However, I don't know if there is enough market out there for a commercial newsletter-type operation such as Fred is proposing. I haven't seen any of the material he discusses in his prospectus, which outlines some ambitious goals.

BALLY GAMES should have two new members in the immediate future - PINBALL (or BALLY PIN) and SPACE INVADERS should be available at \$24.95.

RESEQUENCING program by Ron Schweitzer is really a renumbering scheme to be used when you finish up a program and want to have a nice sequence of lines that are a constant interval apart (like 5,10,15,20, etc). Dick Houser has gone over the program and written some comments about it.

PA-1 SERVICE MANUAL is being reprinted by Bally, which is why a couple of dozen subscribers are patiently waiting. All other orders for printed material have been sent out.

arcadian

FIRST REVIEW received from Richard DeForest. We are working on a standardized form and will have it in the next issue.

Sebree's Computing, T.Hays-programmer

Program games are, UFO BATTLE, DOWN THE TRENCH, HIT THE PEDESTRIAN, SUBMARINE MINE FIELD, MUNCH AND SUPER WUMPUS.

Also submitted was MATH ROUTINES.

Received all of the above on two tapes. Neither tape would load into my machine as readable programs until I rerecorded them with another tape player into my tape player.

UFO BATTLE- Game has great sound effects and screen changes. the explosions are the key to this program. Do not cheat by keeping TR(1) pulled. I did and ended up with a score of 29,853 on the third try!!!

DOWN THE TRENCH- In my opinion this is the best of the games. The program demands dexterity, perseverance and concentration to succeed in the mission. Outstanding sound and 3D graphics. A very good program utilising the memory of the BALLY.

HIT THE PEDESTRIAN- Another 3-dimensional game to keep you on your toes. The man falls apart if you move KN(1) to fast. Make the below changes and you will stop this situation and have about 200 bytes left or 11% of the memory to improve the sound or graphics

205 Q=1000;GOSUB Q

210/530 change all lines with BOX KN(1);2+M,-,-,- to read
BOX Z(+or- if called for),-,-,-

290, 375, 452, 490 change to CLEAR ;GOSUB Q

1000 Z=KN(1);2+M;RETURN

SUBMARINE MINEFIELD- Moving the sub through 230 mines is tricky and if you add 3 depth charges or scanning mines you have lots of problems. This one has a realistic sea bottom that is alive with creatures (the stack being manipulated causes this illusion). Find 14 bytes and change line 52 to read BOX 0,40,160,1,1;FOR A=1TO230 to show sea level. IF PX(-,-) described in Oct. ARCADIAN was used to detect for mines.

MUNCH- This one is full of suspense. It has enough memory left to add a search routine to check that at least one bit is removed from the screen or to subtract points from the player.

SUPER WUMPUS- If you have never hunted Wumpi, then try this game. Excellent use of different sound effects and use of dual sound effects are unique. This program has two listings. The first is to instruct the player and the second is the game. This saves the memory for the many branches, subroutines and sound effects.

MATH ROUTINES- For 3-dimensional graphics. This program calculates sine, cosine and arctangent more than accurate enough for the integer basic of the BALLY. The square root has a fast and a slow version depending on the accuracy needed.

SUMMARY- All programs come with listings and complete documentation. They use all of the functions of the BALLY BASIC and have several unique sound effects. Instructions are duplicated in listing and program and this uses up memory which could be put to better use.

MEMORY ADDRESSING AND BASICALLY BASIC

As mentioned in previous ARCADIANS, the 4K of RAM contained in the ALCAD is used in two ways.

The first n bytes (n determined by the value of the Vertical Update Register, Port 10D) are used for video generation. Within this n bytes, each pair of bits defines one pixel starting with bits 7 and 6 of relative byte 0 (absolute address 10000 of 103840) and continuing thru bits 1 and 0 of relative byte 103839.

The remaining 4096-n bytes are used by the on-board operating system, the on-board games and the game cassettes for any required variable data storage.

Concerning ourselves first with the "picture area" or that area of RAM that is permitted (by the Vertical Update Register) to be displayed, we find that each 2 bit quantity represents a 1-of-4 color value for the respective pixel. Which specific color is displayed for a given pixel depends upon the value of the 2 bits defining that pixel; the values output to Ports 0-7 and Port 9 as well as the left-to-right position of that pixel on the screen.

The "variable data" area, on the other hand, is used as in any 8 bit computer. Data values are stored, worked upon and retrieved on a byte (8 bits)-by-byte basis. Any need for a large data area will, of necessity, reduce the amount of memory available for --and thus the vertical size of-- the display.

BASIC requires only slightly more than average space for this data area with two important exceptions: The actual BASIC Program that is to be executed (interpreted) and any associated data. The first provides all the instructions and data for the program; the second provides all this storage and still leave a display on the screen, all in 4K of memory. The first trick reduces the number of available colors from 4 to 2; the second involves a modified memory addressing scheme.

If the number of available colors is reduced to two, then one bit in every two-bit pixel becomes useless for display. For example, let us assume the screen is made up of outputting a 0 to the Horizontal Boundary Register (Port 9). Let us further assume that a 7 (white) is output to Ports 0 and 1 and a 0 (black) is output to Ports 2 and 3. The result is displayed for that pixel and a two-bit pixel value of either 10 or 11 will cause black to be displayed for that pixel. It is seen, then, that the least significant bit of every two-bit pixel is no longer needed for display purposes and can be used for something else. That new use is the BASIC Program and String storage. Cues, huh?

For those who like to calculate, the following is offered:

```
Screen (RAM) start      4000H (16384D)
BASIC data start        4010H (16390D)
Program and String area 4018H (16398D)
Screen and String area 4018H (16398D)
```

Since only 4096-n bits are available, the actual BASIC Program storage area is 3680/2 = 1840B.

We have now created a minor problem for ourselves, however. Basic Program and Strings must be retrieved from memory by reassembling 8 bits from every other bit of two consecutive memory bytes. This is a problem. Variables, however, must be retrieved and stored as bytes. This means they are stored in the same retrievable area of memory. In evaluating memory, we must be continually switching from one mode of retrieval to the other without, hopefully, impacting the design of the actual BASIC Interpreter.

This problem was solved by creating two machine-language subroutines with BASIC Basic. One of these (residing at locations 2F00H to 2F5EH (12230D to 12262D)) is used to retrieve ANY data from memory and the other (residing at locations 2F5FH to 2F7EH (12263D to 12285D)) is used to store ANY data in memory. When either of these routines is called requesting storage/retrieval of data, the location is called the "address" is 0, data is retrieved/stored as-is in 8-bit bytes. If, however, the 16-bit representation of the memory address is negative (i.e. bit 15 of the address is 1), additional action is taken prior to storage/retrieval. First the memory address is doubled (without carry), then the data is retrieved/stored. This means that the memory address quantity is stored/retrieved with its odd number bits in the even number bits of the first memory byte and its even numbered bits in the even number bits of the second memory byte. (Remember bits are counted from the right, 0 to 7, corresponding to the power of two that bit represents.)

We have now solved all data storage/retrieval problems for the BASIC Interpreter and have done nothing to the 280 CPU. When cycling through memory trying to execute instructions, if the CPU is ever caused to execute part of our "every other bit" data, it will not know what to do. The CPU thinks that each memory cycle will provide 8 meaningful bits of data from one memory byte, not 4.

Although this explanation is necessarily brief, it is hoped that it can now be seen why it appears that memory is present from ADDRESS to ADDRESS (-24576D to -22528D) but machine language programs are only 4096 bytes long. The above mentioned subroutines, and any data interchange with memory is done on an every-other-bit basis. This should also explain why BASIC Basic cannot access any add-on memory addressed above the highest positive address (2F7FH or 12762D).

POWER ON INDICATOR was suggested by Ed Mulholland, and the following sketch comes from Chuck Zellers showing how it can be done. The hole in the top cover should be big enough so that the LED protrudes, and is not constrained (so the cover is easily replaced). The legs of the LED are strong enough for this. Once you solder the LED/resistor across capacitor C9, position the LED vertically and put a dab of vaseline, heat sink grease, etc., on the tip, then lower the cover. The grease will make a mark on the cover, telling you where to drill the hole. Radio Shack (ugh) parts are 276-041 LED, and 271-030 resistor, 4.7Kohm, 1/4 watt. (almost any value resistor will work) I prefer PolyPaks at about 25% the cost.



TELEPHONE COUPLER mentioned previously (p.58) apparently will not work with GTE telephone equipment. Chuck Zellers proposes using an 8 ohm to 2Kohm impedance matching transformer with the speaker on the 8 ohm side.

MICROTREK by Bill Andrus (7034 Thomas Dr., N.Highlands, CA 95660) is a very small but interesting version of the Star-Trek game. This version was originally shared by the North Carolina TRS-80 User Group. In playing, watch your energy level and remaining time.

- Command Summary:
- 1) Move to Sector (row,column)- On an 8 x 8 quadrant of sectors, you can move to any legal, unoccupied sector. If you are adjacent to a Starbase, you are docked, restoring your energy and in a safe haven from which to fire. If either sector command is zero, the command is cancelled.
 - 2) Move to a New Quadrant-extends search for Klingons and Starbases.
 - 3) Fire on Sector (row,column)-Watch energy. Again, if either value entered is zero, the command is cancelled.
 - 4) Sensor Report(of current quadrant): * are stars; B is StarBase; K is Klingon; and E is Enterprise
 - 5) Status Report:These are optional, upon-request displays
- An extended version is available from Bill at \$1.50 your tape, 3.50 on his.

PROGRAM NAME MICROTREK

```

Line #      Statement(s)
1  MICROTREK
2  BY BILL ANDRUS
3  RETURN
20 CLEARINT=0
40 D=RND(40);IF D<30 GOTO 40
50 W=RND(35);IF W<10 GOTO 50
60 D=D*(W)/20;L=10000
70 PRINT "MICRO TREK"
100 A=K;K=S;S=0;T=10
110 FOR I=1 TO 64:Q(I)=0
120 A=RND(12);IF X(2)=I
130 IF X=3,IF K<W,Q(I)=2;W=W+1
140 NEXT I
150 X=RND(64);IF Q(X)>1 GOTO 150
160 Q(X)=3;GOSUB 250;B=RND(17)
170 IF B>5 GOTO 200
180 Q(X)=4;S=(X-1)/8;T=X-5;B
200 CLEARIC=-5;IF C<0 C=-C
210 Q=-T;IF Q<0 Q=-Q
220 S=0;IF C<2 IF Q<2 Q=1
240 IF (K+Q)+(Q-1) GOTO 270
250 GOSUB 800;PRINT #4,H,"UNIT
      HIT FROM"
260 PRINT"KLINGONS,"
270 IF Q=1,LE0000
280 INPUT "COMMAND: "A
290 IF A=1 GOTO 350
300 IF A=2 GOTO 400
310 IF A=3 GOTO 450
320 IF A=4 GOTO 550
330 IF A=5 GOTO 650
340 GOTO 280
350 GOSUB 920;K=(X-1)/8+2;IF
      Q(X)≠1 PRINT"SECTOR OCCUPI
      ED";GOTO 350
360 W=1;GOSUB 870;Q(X)=3;
      Q(E,8+T)=1;GOSUB 850;
      GOTO 240

```

PROGRAM NAME MICROTREK

```

Line #      Statement(s)
400 G=RND(250)+500;U=1;GOSUB
      100;GOTO 100
450 GOSUB 920;U=2;GOSUB 870;
      X=(Y-1)/8+2;Q(X);IF U<2
      GOTO 230
460 IF U=3 PRINT"YOU DESTROYED
      YOURSELF!";GOTO 990
470 IF U=4 PRINT"STARBASE DEST
      ROYED!";S=10;T=10;GOTO 200
480 IF R=500 IF RND(1000)≠6
10 PRINT "YOU MISSED!";
      GOTO 230
490 Q(X)=1;X=K-1;W=W-1;IF W<0
      GOTO 250
500 PRINT"MISSION ACCOMPLISHED
      !";GOTO 990
550 CLEAR:GOSUB 630
560 FOR I=1 TO 8;PRINT#1,I;
      FOR J=1 TO 8
570 X=Q((I-1)*8+J);IF X=0
      PRINT "X"
580 IF X=1 PRINT "X"
590 IF X=2 PRINT "K"
600 IF X=3 PRINT "E"
610 IF X=4 PRINT "B"
620 NEXT J;PRINT#1;NEXT I;
      GOSUB 630;GOTO 200
630 PRINT#1,2,3,4,5,6
7 8;RETURN
650 CLEAR;PRINT#1,STATUS
      REPORT
660 PRINT"SECTOR: ",17,E+1,""
      ,W;IF
670 PRINT"STARBASE: ",17,D
680 PRINT"ENERGY: ",19,L;PRINT
      "KLINGONS: ",17,W
690 PRINT"CONDITION:
      ";GOSUB 700;GOTO 200
700 IF Q=1 PRINT"DOCKED";RETURN
      N

```

PROGRAM NAME MICROTREK

```

Line #      Statement(s)
710 IF K)≠ PRINT" RE";RETURN
      N
720 IF L>200 PRINT" GREEN";
      RETURN
730 PRINT"YELLOW";RETURN
850 E=(X-1)/8;F=X-E;RETURN
860 H=(RND(50)+200)*X/5;U=1;
      GOTO 900
870 R=((Y-E)+(Y-E))+((Z-F)*Z
      -F))/100
880 G=R/10;IF G=0 RETURN
890 J=6;G=(R+G+6)/2;IF G<1 GOTO
      0,890
900 L=L-4;G;IF L<0 RETURN
910 PRINT"OUT OF ENERGY!";
      GOTO 990
920 INPUT"SECTOR ROW: "Y;IF Y=
      0 GOTO 280
930 IF (X+1)+(Y+8) GOTO 920
940 INPUT"SECTOR COLUMN: "Z;IF
      Z=0 GOTO 280
950 IF (Z+1)+(Z+8) GOTO 940
960 RETURN
970 PRINT"OUT OF TIME!";GOTO
      990
990 PRINT"GAME OVER."

```

arcadian

RESEQUENCING Program by Ron Schweitzer

This program will renumber a Bally BASIC program and print the renumbered program on tape. It will fix GOTO and GOSUB as long as they are not computed, i.e. GOSUB C, where the C will not be changed. However a GOSUB 120+C will be changed if there is a line number 120. It is slow, but still faster than editing. This program is 473 bytes long as written here but can be shortened to ...

426 bytes by deleting Line 20000

377 bytes by above and deleting Line 20050

366 bytes by above and changing Line 20040 to INPUT ".FL#";0, ".SP";G;:PRINT

349 bytes by above and changing Line 20080 to NEXT A:PRINT ":RETURN";STOP

This program requires a "@(X)" for every line in storage. The resequence program is renumbered along with the object program. Spacing between the two programs can be accomplished by adding some dummy lines after the object program.

Notes on Ron's program, by R.M. HOUSER

First key in the program of the byte length that you want. Then dump this on a cassette and plan on saving it. Now RESET the BALLY, and load the object program into memory from its tape. When finished, load the resequence program after it. This can only be done if there is enough memory space and you do not have a conflict in line numbers.

Now add Line 1 GOTO 20000 (GOTO 20010 if 20000 has been deleted per above)

Now push WORDS RUN GO and the CRT will show 'RUN'. After a short wait . . .

The computer will ask for 'START NO'. Put in 0, this will automatically set

'FL#'

and get rid of GOTO 20000 (or 20010) later on, and make the first line be 0+Spacing. At this time start the tape recorder with a new tape to load the renumbered program on. The computer will now ask for 'SPACING' and enter the line interval you wish . . .

'SP'

You will now see the object program be renumbered on the CRT. When you see that the renumbering has reached the resequence program (20000 or 20010), stop the tape recorder to save having to delete these lines later.

NOTE :: The program stored in the Bally memory is still the old line numbered program. The renumbered program is on the tape. If you now RESET the Bally and load the tape, you will see some garbage at the beginning that will drop out later when the program is run. List the program and delete any lines of the resequence program. Load the program on a clean tape. If you have a long program, you will probably have to break it into two, and some of the GOTO and GOSUB may have to be edited by hand. : : : Thanks for this program Ron.

POOR RESPONSE from Apple TV and Computing (Dick Stroik) 2606 S. Robertson Blvd, LA 90034 has been reported. If you have had any negative dealings with this company, drop a line to R.Tietjens 3226 E $\frac{1}{2}$ Road Rte 2, Clifton CO 81520.

A CLUB has been started in the Grand Junction area that meets at Mr. Tietjens' house on the second Tuesday of the month at 7pm.

CHECKERS CORRECTION by the author, John Collins-

line 260 should read S=U-B+F; IF @(5)=3 J=1

line 620 should read IF @(U+F)=3 IF @ (U+C-F)=1 RETURN

arcadian

PROGRAM NAME RESEQUENCING

Line #	Statement(s)
20000	RESEQUENCING BY
	RON SCHWEITZER
20010	N=0; @ (0) = % (-24576)
20020	FOR A = -24574 TO A+1796-SZ;
	IF % (A) ÷ 256 # 13 NEXT A
20030	N=N+1; A=A+2; @ (N) = % (A);
	NEXT A
20040	INPUT ". START NO "0, ".
	SPACING "G"; PRINT
20050	PRINT; PRINT; PRINT ". FROM
	LINE ", #0, 0, " TO LINE
	", (N-1) x G + 0, " STEP ", G;
	PRINT; PRINT
20060	M=0; GOSUB 20120; FOR A =
	24574 TO A+1796-SZ; TV=% (A)
	; B=% (A) ÷ 256; IF (RM=13) + (RM
	= -243) GOSUB 20120
20070	IF (RM=110) + (RM=111) GOSUB
	20090
20080	NEXT A; PRINT; PRINT; PRINT
	" : RETURN; NT=0; RETURN; NT=0
	; STOP
20090	T=0; FOR B=A TO A+5; IF (% (B)
	÷ 256 - 53) ÷ 6 = 0 T=T+10+RM+5;
	A=A+1; NEXT B
20100	FOR B=0 TO N; IF @ (B) = T
	PRINT #0, B x G + 0; RETURN
20110	NEXT B; RETURN
20120	PRINT #4, M x G + 0; TV=32;
	M=M+1; A=A+2; RETURN

USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

ENTER A SPACE BETWEEN LINE # AND STATEMENT IS DONE BY THE UNIT

GROUP MEETINGS are being held at Bruce DeVries' home, 2036 North Highland, Apt. B, Orange CA (714) 637-5700 reports Bob Moore. These are held on the second Wednesday of the Month.

ADS

W&W report that they now have seven tapes available with five programs each, and \$10 per tape. See last issue for address.

DEALER SELL-OUT a success. We still have some items in stock, selling at cost. As a special offer to ARCADIAN subscribers we will special order any Bally products at a very special price. Send stamped self addressed envelope(SSAE) for price list to VIDEO ENVIRONMENT +, INC 580 New Loudon Rd. Latham NY 12110

A program & information exchange has been established for "Arcade" users. For further information, send SASE to: F.Cornett, 6115 Clybourn #25, North Hollywood, CA 91606

FOR SALE: BALLY ARCADE WITH 4 PISTOL GRIPS, \$229. BASIC CARTRIDGE, \$29.95; BASEBALL/TENNIS/HOCKEY/HANDBALL, AND 280ZZAP/DODGEM, EACH HALF PRICE.
R. BENNINGTON, P.O. BOX 1021, SOLANA BEACH, CALIFORNIA 92075.
(714) 481-8428.

INVASION is offered by George Collins, 30 Sierra Ave., Piedmont, CA 94611 on a tape for \$5 with documentation.

REVIEW OF THE BALLY SYSTEM is contained in an article by Dick Nitto in the November issue of KILOBAUD

More Ads

Programmer Wanted: Business programs written for small quick-printer. Herb Weintraub Instant Printing, 205 North Tradd St. Statesville, NC 28677

FREE shipping on any order and 10% off any orders over \$50. Complete line of Bally products, Also Arcadian software (1rf) for sale or trade Winsor Computers, 466 Selfridge Dr., Colorado Springs CO 80916 (303) 596-4921

DIGITRENDS Inc 1813 E. 12 St. Cleveland OH 44114 are still carrying the complete software/hardware line in the Ohio area.

= 92 =

ARCADIAN

Robert Fabris, tired
3626 Morrie Dr.
San Jose, CA 95127

FIRST CLASS

94

At least two people report having successfully interfaced full-size ASCII keyboards to the Bally Arcade/Bally Basic combination. In brief, these keyboards replace cassette tape as the Basic input source. The schemes differ slightly in that one of them (Jerry Tindle) has simulated the Kansas City Standard in order to transfer the ASCII keyboard data, and the other (Edmund Mulholland) bypasses the KC standard phase and provides a serial data stream from the ASCII keyboard to the audio cassette adapter. Both schemes require some audio cassette hardware modifications as well as some circuit assembly.

They both provide the look and feel of keyboard input for all except Basic "Key" words (LET, FOR, etc.). These Key words are generated from the ASCII keyboard by depressing a lower-case alpha character (e.g. PRINT is entered by typing a lower-case t).

For further information, contact the authors directly:

Jerry L. Tindle
8414 Staunton
Austin, Texas 78758

Edmund Mulholland
Route 4, Box 424 H
N. Wilkesboro, N.C. 28659

Bob Fabris,

Enclosed find check for Volume II of the Arcadian in the amount of \$10.

Please run another ad for us and note that we now have 7 tapes available with 5 programs each. Price \$10. each.

Thank You

Jeri

WFW

FOR SALE: BALLY ARCADE WITH 4 PISTOL GRIPS, \$229. BASIC CARTRIDGE, \$29.95;
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R. BENNINGTON, P.O. BOX 1021, SOLANA BEACH, CALIFORNIA 92075.
(714) 481-8420.

R. FABIS - I PRODUCED THIS IN THREE SIZES
IN CASE YOU WANT TO CUT/TAPE THESE FOR REPRODUCING.



11

AD FOR ARCADIAN

DEALER SELL OUT, A SUCCESS-WE STILL HAVE SOME ITEMS IN STOCK, SELLING AT COST. AS A SPECIAL OFFER TO ARCADIAN SUBSCRIBERS WE WILL SPECIAL ORDER ANY BALLY PRODUCTS AT A VERY SPECIAL PRICE. SEND STAMPED SELF ADDRESSED ENVELOPE FOR PRICE LIST TO: VIDEO ENVIRONMENT +, Inc.
580 NEW LOUDON ROAD
LATHAM, NEWYORK 12110

15 Sept 1979

Bob—

As a new subscriber I find the newsletter very interesting and helpful. My main interest now is Keyboard/Memory Add-on Capabilities. Also my concern is that Bally is never going to release any add-on feature. I read an article in "Electronic News" that said as of Jan 79 Bally sold over 20,000 units at a loss and that if by Jan 80 no profit was realized the whole line (Arcade/Home Library Computers) would be dropped. Enclosed find two dollars for a copy of Hacker's Manual. ✓

Attached is a diagram for installing an LED to indicate power on. It is easily installed using an LED and Resistor. This is a variation of a suggestion by Ed Mulholland of Wilkesboro, N.C. Mounting LED and Resistor using legs of LED for support. No attachments are needed to hold LED to top cover. Top of LED should protrude above keypad with cover off.

Using heat sink Compound or other material place a dab of it on top of LED and lower Case in place to mark where hole is to be drilled.

As to telephone Coupler - we who live in areas where GTE phone equipment is used Cannot use Radio Shack Coupler as described in Kilobaud - So possibly the best way would be transform with 8Ω to $2K\Omega$ impedance with speaker on 8Ω side would work assuming this does not violate FCC/phone regulations.

I would be interested in a survey of dealers/distributors to see how many have dropped Bally because of delivery or service problems. Also any known fixes for problems with basic unit or audio cassette interface I would appreciate.

I am on my 5th unit and 3rd interface, while trying to check availability of chips for interface, I noted some chips were not available (4503, 4572, 4024)

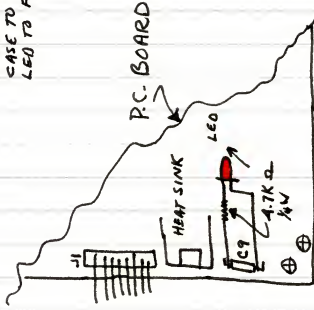
If we could find out from Bally or other sources the various type of failures (indication and the part that fails) a chart could be arrived at that could be used for trouble shooting and repair. If the problems I have had are an indication, the failure rate is fairly high. Heat was an early problem with IC V18 but I believe the CMOS Chips in Cassette interfaces are prone to static failure. I would suggest to plug or unplug interface from Unit or Cassette only with power off and to leave plugged in as much as possible so as not to increase possibility of a problem while plugging or un-plugging. Well, that's all for now.

Chuck Zeller
6000 Flektwood St.
Lincoln, Nebraska
68576

LED protrudes slightly from case



DRILL HOLE IN
CASE TO ALLOW
LED TO FIT THRU.



PARTS: RAMO SHACK #276-041 RED LED

#271-030 4.7K Ω RESISTOR

NOTE: OBSERVE POLARITY OF LED ACROSS C9 (+5V to gnd)

MR. & MRS. ROBERT O. MOORE
3465 Bayberry Dr.
Chino, Calif. 91710

Mr. Robert Fabris
3626 Morrie Dr.
San Jose, Calif. 95127

Dear Bob:

Since it is renewal time and I have been meaning to write you, I thought this would be a good time to combine both efforts and write.

First, you should be commended for your efforts in putting the Arcadian together each month. We Bally enthusiast appreciate it and I wanted to tell you so. Even though you have said you compile a lot of information submitted by other people your efforts have to take many hours to put it all together.

Secondly, would you please mention in the Arcadian we in Orange County and nearby areas (Down in Disneyland) are getting organized. We meet once a month on the second Wednesday of each month. We have two T.V.'s and two Bally units going all evening. The group seems to consist of half programming enthusiast, and half game enthusiast. We have professional programmers that discuss ongoing programs, and work out any bugs in any programs that people bring. We also have champion players in most of the games designed by Bally-- The winner takes on all challengers. It really is a fun evening, and that is the essence of the meeting.

Thirdly, in the game Bangman pg. 48, I have found resetting the CX cursor all through the program to begin further in makes for a more aesthetic game. For example, line 9035 CX= -73 +((Hx8)+2) adds a lot to the looks of the program.

In the Simon program pg. 35 I have either programmed it wrong or can not seem to figure out the correct way to work the joystick. It would be nice if all contributors added explanatory remarks with all programs submitted.

In the Black Box Game pg. 74 I have found two additional errors. Line 145 needs further corrections besides the two mentioned on pg. 77.
LINE 145 CX= -47; PRINT #2,B; CX=67; PRINT #2,B - ALSO,
LINE 180 CX= -35; ~~PRINT #2,B~~ PRINT " 0 1 2 3 4 5 6 7 ";
CY=40

I found unnecessary items after the second B in line 145, and unnecessary item after the first Print, just inside the first quote marks in line 180.

In the Space War game pg. 79 I found three errors. I believe in the early issues you warned us about two of the errors. Mr. D. Ibach must be a professional programmer because he used an * sign for multiplication

in lines 300 and 500. The third error is in line 820. The second line entry has a y-5 in it, and the line should read line S-10,T-10,1. Otherwise the program is a fun program. I wish somebody out there would submit a program for TWO BOWLERS, or more.

I cannot think of anything else to say. Enclosed is my ten bucks for another year of the Arcadian. If I am ever in the San Jose area, I will look you up. I extend an invitation to you if you are ever in the L.A. area. If you ever do come down for a reason try to make it a second Wednesday of the month. You might as well mix business with pleasure.

I almost forgot to mention where we have our Bally Meetings. We have been having them at Bruce DeVries house, 2036 North Highland, Apt. B, Orange, Calif. 714-637-5700. We hope to grow to such a large organization that it will take a town hall, 20 t.v.'s, and 20 Bally units to have a meeting.

In closing, keep up the great work Bob, we all do appreciate your efforts.

Sincerely,

A handwritten signature in cursive script, appearing to read "Bob M.", written in dark ink.

Robert O. Moore

Mr. Edmond Mulholland
Route 4, Box 424 H
N. Wilkesboro, N.C. 28659

October 8, 1979

Mr. Robert Fabris
3626 Morrie Drive
San Jose, California 95127

Dear Bob:

Enclosed is a schematic for the keyboard entry system I talked with you about over the telephone. The basic idea is to provide serial data at 150 baud and then read this data with a : IMPUT.

I used an AY51013A UTART board sold by Electronics Systems because I was not sure what I might need to develop this system, and also because it provides various methods of manipulating. For those who want to save some money, my schematic is shown without this additional circuitry. The keyboard encoder is an AY53600. I chose this encoder because it has a latched output rather than a continuous stream of data. You release this data by taking a negative strobe from Pin 16 of the encoder and applying to Pin 23 of the UTART. I used a .1mf capacitor for a longer key debounce time, and used the clock from the interface to synchronize the UTART. It may be possible to use other methods that would work; but, being anxious to use the keyboard, I left it this way. Also, a TPST switch is used to isolate the data entries. The addition of the 2.2K and 22K resistors eliminates the need for the switch, but it would not hurt to have a method of isolating these signals.

I have not been able to get the inputs ↓, \, PAUSE, GO+10, and HALT. As you can see, these characters are only a minor inconvenience and can be added to the program later. Also, other characters are available as new graphic symbols.

The cost of the keyboard for this project is approximately \$50, not including a power supply. I chose to use a separate power supply because of not knowing how much power the Bally unit could provide, and also because I need power for future additions. My choice was JAMECO, the JE200 and JE205. If this is your choice, pay close attention to the instructions on winding the toroidal transformer. This addition increases the cost to approximately \$80. If the Electronics Systems board (with parts) is used, the cost is approximately \$110. By shopping the surplus stores and maybe using a smaller power supply, you can cut your cost to approximately \$50 or less.

Mr. Robert Fabris
Page 2
October 8, 1979

Only a few keys need to be remarked from a standard keyboard, and this is left up to the user to decide. I have enclosed a truth table so each may decide what he wants. Keep in mind, Bally uses eight bits, with the MSB bit always a zero. This truth table works only when wired as shown; otherwise, you will get different results. The control key is not used, but some users may want to try various ideas.

Don Lancaster's TV Typewriter Cookbook was an invaluable source for this project, and I recommend it as a guide.

Yours truly,



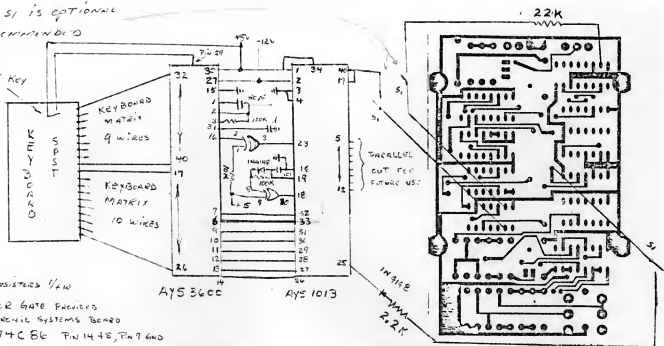
Edmond Mulholland

nm

Enclosures

P.S. How about next to your return address put a number
to show ~~our~~ membership, i.e. Stampicker - 41 set.

SHIFT Key



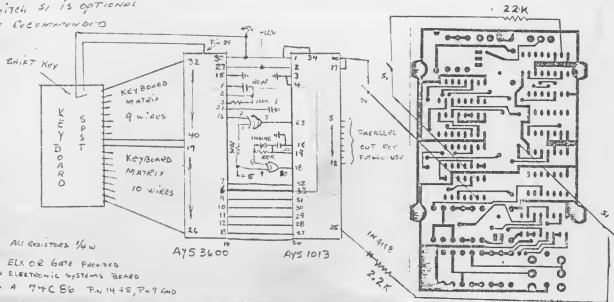
ALL RESISTORS $\frac{1}{4}W$

ELX OR GATE PROVIDED
ON ELECTRONIC SYSTEMS BOARD
IS A 74C86 PIN 14 IS, PIN 7 GND

PIN	<	Q	A	Z		H	+	>	@	!
40	1	BOX	—			H	+		RETURN	1
39	@	W	S	X		%]		↑	"
	2	TO	INPUT			%	IF		GOTO	2
38	#	E	D	C	←	B	L	ERASE	5	[
	3			÷	←	B	L	ERASE	6	NEXT
37	B	R	F	SPACE	(	GO			/	"
	4	FOR		SPACE		GO			7	"
36	%	T	G	V				=	)	SPACE
	5	PRINT		RND				-	)	SPACE
35	>	Y	H	B	*	>	+		*	!
	6		LIST	(MULTIPLY)	:	>	;		*	!
34	B	U	J	N	=	<	P)	&	#
	7	STEP	RUN	GOTO	=	<	RETURN	Ø	&	#
33	*	I	K	M	?	"		+	<	(
	8	CLEAR	NEXT	IF	/	/		=		(
32	(	O	L	,	.	:	[	←	Ø)
	9	GOSUB	LINE	,	.	;	]	-	Ø	9

AYS-3600 PIN 17 18 19 20 21 22 23 24 25 26

Switch S1 is optional
but recommended



All resistors $\frac{1}{4}$ W

ELX OR GATE PROVIDED
ON ELECTRONIC SYSTEMS BOARD
IS A 74C86 P.N 1445, P.N 7 AND

AY5-3600

PIN 40	<	Q	A	Z		H	+	>	@	!
	1	BOX	—			H	+		RETURN	1
39	@	W	S	X		%]		↑	"
	2	TO	INPUT			%	IF		GOTO	2
38	#	E	D	C	←	\$	L	ERASE	0	[
	3			÷	←	\$	L	ERASE	6	NEXT
37	R	F	SPACE	(	GO				1	"
	4	FOR	SPACE		GO				7	"
36	%	T	G	V				=	)	SPACE
	5	PRINT	RND					-	)	SPACE
35	>	Y	H	B	*	>	+		*	!
	6	LIST	(MULTIPLY)	:	>	:	:		*	!
34	8	U	J	N	=	<	P)	\$	#
	7	STEP	RUN	GOTO	=	<	RETURN	Ø	\$	#
33	*	I	K	M	?	"		+	<	(
	8	CLEAR	NEXT	IF	/	/		=		(
32	(	O	L	,	.	:	[	←	Ø)
	9	GOSUB	LINE	,	.	:	]	-	Ø	9

AYS3600 PIN 17 18 19 20 21 22 23 24 25 26

8414 Staunton
Austin, Texas 78758
October 15, 1979

Mr. Robert Fabris
3626 Morrie Drive
San Jose, California 95127

Dear Bob,

Enclosed is my check for \$15.00 instead of \$10.00. Please put the extra in your postage fund. I would also like to get on the list of Arcadians to receive any updates on expansion RAM board.

My unit number is BL 1200, No. 4425. I am using a full ASCII keyboard on my unit. After many trials and errors, I discovered that the output of the cassette interface into the Bally was not TTL serial, even though the printer output is TTL serial. The output of the cassette interface is Kansas City standard with the decoding done in the Bally. I built a "Bit Boffer" from the CMOS Cookbook, Page 389. I only used the upper section of the circuit on Page 391; the modulator is clocked in from the clock of the cassette interface pulled from pin 12 IC4 at 19.2KHZ. The output from the bit boffer plugs into the cassette interface speaker input. The keyboard is turned on by the: input command. Also, I have built a UART clocked to the same 19.2 KHZ signal to allow parallel and serial output from the Bally. With the : input:* print command, you can input and output at the same time.

I realize that I have gone out the back door, side door and roof to get in the front door, but it does work. I do not want to get into the business of building bit boffers, but if anyone is interested in building one, they can write to me.

The light pen was a bear also. The Y coordinates were easy; not so with the X. While in Chicago last month I called Bally and talked to Chuck Vollmer (a real nice guy) and he referred me to the (brain), Jeff Fredrickson and got some more information on the light pen input. He said that the speed of the light pickup photo diode, photo transistor is very important. I finally used a phototransistor into a comparator. It works okay. Don't have any good light pen programs yet. Have not had time to develop any, but the light pen can be used in a lot of existing games.

Sincerely,



Jerry L. Tindle

CARLTON W. CARROLL
Rt. 1, Country Meadows
Barboursville, Va. 22923
October 18, 1979

Dear Robert,

Please find enclosed a check for \$10 to cover next year's membership fee. I think you have done a fantastic job and I am looking forward to the upcoming year. I do have one suggestion. I and maybe a lot of other people do not have a local distributor and have to order game cassettes via mail. It is very difficult to guess how good the games are and what the types of actions occur during play. If some of the members have purchased the games maybe they could review them for other members. Thanks.

Sincerely,
Carlton W. Carroll

18 October 1979

Mr. Robert Fabris
3626 Morrie Dr.
San Jose, CA 95127

Dear Sir:

A small group of us have put together a program exchange and newsletter in an attempt to help fill the void of User communication. I want you to know that our intent is not to detract in any way from your greatly appreciated effort. We wish merely to provide a means for the exchange of program information with a higher volume than your publication is able to provide.

We would greatly appreciate your placing an ad in the October issue of the "ARCADIAN" as follows:

A Program & Information Exchange has been established for "Arcade" Users. For further information, send SASE to: F. Cornett, 6115 Clybourn #25, No. Hollywood, CA 91606

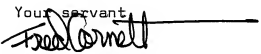
I have been in Europe for the past 90 days, returning only two weeks ago, and was extremely pleased to read your "Add-on" information. I sincerely hope it isn't too late to be included. My answers to your questions on pg 55 are as follows:

- (1) YES
- (2) YES
- (3) YES

Model #BPA 1100 Ser # 12497

If there is any way I can be of service to you, please do not hesitate to write or call.

Your servant


Fred Cornett
(213) 763-7701

NOTE: I have enclosed a copy of our offer for information purposes.

BALLY ARCADE OWNERS ARISE:

Do you remember the pleasure and sense of relief you experienced when you first received your subscription to the "ARCADIAN"? Do you, as we do, wait with great expectation each month for your issue to arrive, only to feel somewhat let down because the "ARCADIAN" doesn't quite satisfy your particular needs? Do you look forward to the programs each month, but afterwards wish that more care was taken in their selection and "glitch-free" operation? Do you use programs as a learning process to extend your programming skills and heighten your ability to use the "Arcade" more extensively?

As your own knowledge has expanded, have you gone page-by-page through the "ARCADIAN" looking for information that you know is there but can't find? Have you longed for a tutorial dealing specifically with one area you are trying to understand, but have nowhere to turn? Have you purchased programs, only to have them arrive without a listing or documentation, and can't get them to run or comprehend the programs purpose?

TAKE HEART!! While we can't serve your every need, we can take care of many. A small group of us (Bally users) have gotten together (in mutual frustration), with intent of creating order out of chaos. We are deeply grateful to Bob Fabris for his selfless work in creating and maintaining the information flow found in the "ARCADIAN", and have no intent or desire to detract one iota of interest or acclaim from that publication. We merely wish to offer an additional source of information which is primarily aimed at the "Bally Tiny Basic" programmer.

We hereby offer the following printed matter and services:

1. INDEX: A thoroughly comprehensive index to the "ARCADIAN-VOLUME I". Cross referenced by subject matter, software command, hardware, retail source, etc..

2. NEWSLETTER: Containing programs selected for their employment of innovative techniques and unique creativity. Each program selected for publication will be guaranteed "glitch-free", and will include documentation. We will print vital tutorials. Any programs offered for sale by subscribers will be required to meet certain quality criteria, i.e., level of complexity, originality, documentation, capture of interest, etc.. Each issue will contain a programming contest, with prizes awarded to each monthly winner. Winning entry will be published in the following issue. The Newsletter will be published once monthly, and mailed on the 10th of each month. Newsletter format will be continuously changing and expanding as reader needs and interests become known.

3. PROGRAM EXCHANGE: An exchange system has been established allowing the exchange of "Public domain" programs on a cost basis. An individual file will be established for each participant, recording what programs he/she has submitted and what programs have been sent in return, thereby eliminating duplication. This system will allow a participant to request specific types of programs or routines utilizing certain methods. Cost to participant will be 75¢ per program (will be raised as postal rates rise) which will cover copying, filing & postage.

4. TUTORIAL & INFORMATION EXCHANGE: To be expedited exactly as #3 previously mentioned.

How many times have you sent someone \$12.00 for two programs only to find that they are inadequate copies of existing published programs?

What would your reaction be if someone offered you 25 original glitch-free programs complete with documentation for the unbelievably low price of less than 39¢ each?(Newsletter)

How often have you spent 3 - 6 weeks working on a program only to be forced to abandon the project due to lack of memory? I don't know how many times I've wished there was some way to communicate with someone else working on a similar project so I could trade solutions to problems instead of wasting so much time.

By becoming a subscriber now, you can have that communication ability immediately. We will put you in touch with others having similar problems, and send you tutorials dealing with your specific needs.

Our only goal is to facilitate a complete sharing of information, technology, and programming techniques. To reach that end--- We promise never to hold back information shared by you, the subscriber, with us so as to allow us to profit from a product sale at a later date.

A six month subscription fee is \$9.50 which includes (1) "ARCADIAN" Index; (2) Newsletter; (3) Unlimited Program Exchange; (4) Tutorial & Information Exchange.

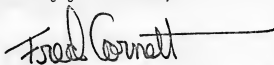
Subscribe Today!! The first 25 orders received will be awarded a subscription to "ON_LINE" (The National Buy & Sell Monthly Forum for the Computer Hobbyist).

Also, all those listed on a multiple order (2 or more paid subscriptions in same envelope) will receive subscriptions to "ON_LINE", in addition to all other services.

Please make all checks and money orders payable to:

F. CORNETT
6115 Clybourn #25
North Hollywood, Ca. 91606

Looking forward to serving your needs,



NOTE: "ON_LINE" is a separate publication without any connection what-so-ever to the above offered services. We hope you find it as useful as we have!

OK

Sept. 13, 1979

R. Tietjens
Micro Minds & Memory
3226 E 1/2 Rd Rte 2
Clifton, CO 81520

The Arcadian
% Robert Fabris
3626 Morrie Dr.
San Jose, CA 95127

Enclosed please find my check in
the amount of \$10⁰⁰, for subscription
to The Arcadian for 2 years (if my
information is correct, Oct 78-Sep 79 and
Oct 79-Sep 80[?]).

News: I will send details of an interface
board to put The Bally on the S-100
buss next month. Target price is about
\$150 kit, but may be less.

Also, I should have a routine for loading
TRS-80 tapes into expansion memory.

The MicroDaSys keyboard/mother board/
power supply unit (see page 97, Personal
Computing, Mar 79) is recommended for
use with the interface board mentioned
above.

A computer club has been formed
here (near Grand Junction) and will meet
the second Tuesday of each month
at this address, about 7 P.M. No dues.
The name has yet to be chosen.

✓ Rumor has it that you can provide
copies of The Hacker's Manual.
Please advise,

Warning: Apple TV + Computing, 2606
South Robertson Blvd., Los Angeles, CA
90034 has not responded to my
letter and cassette, mailed in July.
Advertising indicates they maintain
a software exchange. So far, the
only exchange I detect has been from
my possession to theirs. } ||

I will gladly exchange programs
with any interested Bally users.
The following are available, on
cassette only (I don't have a printer,
yet):

moon Taxi
Jackpot (a slot machine)
Klingon Capture
Super Mastermind
Biorhythms (true sine curve plotting)
Asteroid Miner
Lion Country Safari
Artillery Duel
Football Predictor
Hex → Dec (a hexadecimal entry routine)
Player Piano with Tunesaver
Alles Lookenspeepers (a response for button-pushers)

Inspection reveals That my particular
Arcade has a single Cermet DIP
for system ROM, wonder if I could
hack the TRS-80 Level II Basic
chips into the empty locations...

Yours,

A handwritten signature in cursive script, appearing to read "Rick Smith", with a stylized flourish at the end.

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Bob Fabris
3626 Morrie Drive
San Jose, CA 95127

Dear Bob:

We are all wondering how your keyboard project is going. Ours is supposed to be in Evansville (the prototype anyway) by the time you get this, but I don't think that it really will be. They haven't started on the extra memory yet, so it will just be a keyboard with room for whatever it takes to expand it. I called Ernie Sams about modifying the Jameco keyboard but he said that you must have given me the wrong name. It wasn't in vain though because we found out (from him) how to hitch the Bally to an IBM printer that we are going to buy from a local bank. It looks like I will be in charge of obtaining parts and actually building our keyboards, so if you see anyplace besides Jameco that has unencoded keyboards, please let me know/

A few of the local ARCADIANs, esp. me and Guy, are very interested in starting a Southern Indiana Bally Users Group (BUG). If you could, we would appreciate a mention in the newsletter. They should call me or Guy (479-7336) if interested. All we need now is a place to meet, and that doesn't appear to be a problem.

I got the interactive program from Jim Unroe. I haven't got the wire strung to my neighbors house yet but it looks like he has a great program. Me and Guy will be testing it at the next Evansville Computer club meeting. If it works like I think it will I'll try a Battleship algorithm next. (There's no reason why all this won't work on a phone either.)

We need 5 of those expand connectors at the store. If you don't mind, please send them COD (UPS). It really makes things easier for us.

The next time that you hear from me may be the notice of some new software from us, if nothing else. Guy has just about finished a home security program using the joystick inputs, and I am still trying to finish my graph and data file program. Has anyone responded to the ad for a software reviewer?

*Please send connectors to the
store, any reply to my house.*

Keep up the good work,

Dave

David Stocker

472(836)-3192

by Tom

MEMORY ADDRESSING and BALLY TINY BASIC

As mentioned in previous ARCADIANS, the 4K of RAM contained in the ARCADE is used by Bally software in several ways:

The first n bytes (n determined by the value of the Vertical Update Register, Port 10D) are used for video generation. Within this n bytes, each pair of bits defines one pixel starting with bits 7 and 6 of relative byte 0 (absolute address 4000H or 16384D) and continuing thru bits 1 and 0 of relative byte n-1.

The remaining 4096-n bytes are used by the on-board operating system, the on-board games and the game cassettes for any required variable data storage.

Concerning ourselves first with the "picture area" or that area of RAM that is permitted (by the Vertical Update Register) to be displayed, we find that each 2 bit quantity represents a 1-of-4 color value for the respective pixel. Which specific color is displayed for a given pixel depends upon the value of the 2 bits defining that pixel, the values output to Ports 0-7 and Port 9 as well as the left-to-right position of that pixel on the screen.

The "variable data" area, on the other hand, is used as in any 8 bit computer. Data values are stored, worked upon and retrieved on a byte (8 bits)-by-byte basis. Any need for a large data area will, of necessity, reduce the amount of memory available for --and thus the vertical size of-- the display.

Bally Basic requires only slightly more than average space for this data area with two important exceptions: The actual Basic Program that is to be executed (interpreted) and any associated Strings. The people at Bally have introduced a rather cute programming trick or two to provide all this storage and still leave a display on the screen, all in 4K of memory. The first trick reduces the number of available colors from 4 to 2, the second involves a modified memory addressing scheme.

If the number of available colors is reduced to two, then one bit in every two-bit pixel becomes useless for display. For example, let us assume the screen is made "all right" by outputting a 0 to the Horizontal Boundary Register (Port 9). Let us further assume that a 7 (white) is output to Ports 0 and 1 and a 0 (black) is output to Ports 2 and 3. The result is that a two-bit pixel value of either 00 or 01 will cause white to be displayed for that pixel and a two-bit pixel value of either 10 or 11 will cause black to be displayed for that pixel. It is seen, then, that the least significant bit of every two-bit pixel is no longer needed for display purposes and can be used for something else. That new use is the Basic Program and String storage. Cute, huh?

For those who like to calculate, the following is offered:

Screen (RAM) start	4000H (16384D)
Bally Basic data start	4E18H (19992D)
Program and String area length	0E18H (3608D)

Since only alternate bits are available, the actual Basic Program storage area is $3608D/2 = 1804D$.

We have now created a minor problem for ourselves, however. Basic Programs and Strings must be retrieved from memory by reassembling 8 bits from every other bit of two consecutive memory bytes. Basic Program Variables, however, must be retrieved as-is from the Variable Data area (they are stored in the non-viewable area of memory). In evaluating Basic statements we must be continually switching from one mode of retrieval to the other without, hopefully, impacting the design of the actual Bally Basic Interpreter.

This problem was solved by creating two machine-language subroutines within Bally Basic. One of these (residing at locations 2FCFH to 2FE6H (12239D to 12262D)) is used to retrieve any data from memory and the other (residing at locations 2FE7H to 2FFEH (12263D to 12286D)) is used to store any data in memory. When either of these routines is called requesting storage/retrieval of data in a location in memory, and the 16-bit representation of that location is positive (i.e. bit 2¹⁵ of the address is 0), data is retrieved/stored as-is in 8-bit bytes. If, however, the 16-bit representation of the memory address is negative (i.e. bit 2¹⁵ of the address is 1), additional action is taken prior to storage/retrieval. First the memory address is doubled (without carry), then the data is stored/retrieved 4 bits per byte from/to two consecutive memory bytes without disturbing unused bits. Specifically, any 8 bit quantity is stored/retrieved with its odd number bits in the even number bits of the first memory byte and its even numbered bits in the even number bits of the second memory byte. (Remember bits are counted from the right, 0 to 7, corresponding to the power of two that bit represents.)

We have now solved all data storage/retrieval problems for the Basic Interpreter and have done nothing to the Z80 CPU. When cycling through memory trying to execute instructions, if the CPU is ever caused to execute part of our "every other bit" data, it will not know what to do. The CPU thinks that an instruction fetch cycle will provide 8 meaningful bits of data from one memory byte, not 4.

Although this explanation is necessarily brief, it is hoped that it can now be seen why it appears that memory is present from A000H to A7FFH (-24576D to -22529D) but machine language programs stored there cannot be executed. Since these addresses are negative, they are doubled by the above mentioned subroutines, and any data interchange with memory is done on an every-other-bit basis. This should also explain why Bally Basic cannot access any add-on memory addressed above the highest positive address (7FFFH or 32767D).

Line #	Statement(s)	Comments
1	MICROTREK	
2	BY BILL ANDRUS	
20	:RETURN	
30	CLEAR; NT = 0	
40	D = RND(40); IF D < 30 GOTO 40	
50	W = RND(35); IF W < 10 GOTO 50	
60	D = (D * W) / 20; L = 10000	
70	PRINT " *MICRO TREK* "	
100	A = 0; K = 0; S = 10; T = 10	
110	FOR I = 1 TO 64; @(I) = 0	
120	X = RND(12); IF X > 2 @(I) = 1	
130	IF X = 3 IF K < W @(I) = 2; K = K + 1	
140	NEXT I	
150	X = RND(64); IF @(X) > 1 GOTO 150	
160	@(X) = 3; GOSUB 850; B = RND(17)	
	; IF B > 5 GOTO 200	
170	X = RND(64); IF @(X) > 1 GOTO 170	
180	@(X) = 4; S = (X - 1) / 8; T = X - S * 8	
200	CLEAR; C = -S; IF C < 0 C = -C	
210	G = F - T; IF G < 0 G = -G	
220	Q = 0 IF C < 2 IF G < 2 Q = 1	
230	D = D - 1; IF D = 0 GOTO 970	
240	IF (K = 0) + (Q = 1) GOTO 270	
250	GOSUB 860; PRINT #4, H, "UNIT HIT FROM"	
260	PRINT "KLINGONS!"	
270	IF Q = 1 L = 10000	
280	INPUT "COMMAND: " A	
290	IF A = 1 GOTO 350	
300	IF A = 2 GOTO 400	
310	IF A = 3 GOTO 450	
320	IF A = 4 GOTO 550	
330	IF A = 5 GOTO 650	
340	GOTO 280	
350	GOSUB 920; X = (Y - 1) * 8 + Z; IF @(X) # 1 PRINT "SECTOR OCCUPI ED"; GOTO 350	
360	U = 1; GOSUB 870; @(X) = 3; @(E * 8 + F) = 1; GOSUB 850; GOTO 200	

USE OF SHADED AREA IS FOR 2ND OR
MORE LINES OF MULTI-LINE STATEMENTS

DO NOT ENTER A SPACE BETWEEN LINE #
AND STATEMENT; THIS IS DONE BY THE UNIT

USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

DO NOT ENTER A SPACE BETWEEN LINE # AND STATEMENT, THIS IS DONE BY THE UNIT

Line #	Statement(s)	Comments
400	G=RND(250)+300;U=1;GOSUB 900;GOTO 100	
450	GOSUB 920;U=2;GOSUB 870; X=(Y-1)*8+Z;U=@(X);IF U<2 GOTO 230	
460	IF U=3 PRINT"YOU DESTROYED YOURSELF!!";GOTO 990	
470	IF U=4 PRINT"STARBASE DEST ROYED!!";S=10;T=10;GOTO 200	
480	IF R>500 IF(RND(R/500)+6)> 10 PRINT"YOU MISSED!!"; GOTO 230	
490	@(X)=1;K=K-1;W=W-1;IF W>0 GOTO 230	
500	PRINT"MISSION ACCOMPLISHED !!";GOTO 990	
550	CLEAR;GOSUB 630	
560	FOR I=1 TO 8;PRINT#1,I; FOR J=1 TO 8	
570	X=@((I-1)*8+J);IF X=0 PRINT " * ",	
580	IF X=1 PRINT " . ",	
590	IF X=2 PRINT " K ",	
600	IF X=3 PRINT " E ",	
610	IF X=4 PRINT " B ",	
620	NEXT J;PRINT#1,I;NEXT I; GOSUB 630;GOTO 280	
630	PRINT" 1 2 3 4 5 6 7 8";RETURN	
650	CLEAR;PRINT" STATUS REPORT"	
660	PRINT"SECTOR:",#17,E+1,"", #1,F	
670	PRINT"STARDATE:",#17,D	
680	PRINT"ENERGY:",#19,L;PRINT "KLINGONS:",#17,W	
690	PRINT"CONDITION: ";GOSUB 700;GOTO 280	
700	IF Q=1 PRINT"DOCKED";RETUR N	

Bill Andrus

DATE 7/28/79

CONCLUSIONS

PUNCH

2

TR

1.	2.	3.	4.
----	----	----	----

20: RETURN

$$3\phi \text{ CLEAR; } NT = \phi$$

1. INITIALIZE D (STARTDATES/TURNS), L (ENERGY),
 W (KLINGENS)

40	D=RND	(40);IF	D<30	GETO	40
----	-------	---------	------	------	----

50	$W = \text{RND}(35)$	IF	$W < 10$	GO TO	50
----	----------------------	----	----------	-------	----

$$D = (D \times W) \div 2\phi; \quad L = 1\phi\phi\phi\phi$$

PRINT SOMETHING

70 PRINT "

MICRO	TREK
--------	-------

START GAME, POPULATE QUADRANT

$$1\phi\phi \quad A=\phi; K=\phi; S=1\phi; T=1\phi$$

110 FOR I=1 TO 64; ~~0~~(I)=0

$$12\phi \quad x = RWD(12); \quad IF \quad x > 2 \quad @ (I) = 1$$

Operand

Operation

1000

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

DOCKING	CHECK
---------	-------

[illegible][illegible]

25	φ	GCS40	86φ	PK LN1
----	---	-------	-----	--------

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
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STATEMENT									
Name	8	10	Operation	14	16	20	25	Operand	Comments
27	0	1	IF	Q=1	L=10000				
• GET COMMAND AND DISPATCH									
28	0	1	INPUT	"COMMAND:"	"A"				
29	0	1	IF	A=1	GOTO	350			
30	0	1	IF	A=2	GOTO	400			
31	0	1	IF	A=3	GOTO	450			
32	0	1	IF	A=4	GOTO	550			
33	0	1	IF	A=5	GOTO	650			
34	0	1	GOTO	280					
• 1 = MOVE TO SECTOR (Y,Z)									
35	0	1	GOSUB	920	X=(Y-1)*8+Z; IF @ (X) # 1 PRINT "SECTOR OCCUPIED"; GOTO	350			
36	0	1	U=1; GOSUB	870	@ (X)=3; @ (EX8+F)=1; GOSUB	850			
• 2 = MOVE TO NEW QUADRANT									
40	0	1	G=RND	(250)+300	U=1; GOSUB	900			
• 3 = FIRE UPON SECTOR (Y,Z)									

Line	Statement	Comments
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[illegible]

STATEMENT

1	Name				Operand				Statement				Comments				71
	8	10	12	14	16	20	25	30	35	40	45	50	55	60	65	70	

```
920 INPUT "SECTOR ROW: " Y; IF Y=0 GOTO 250
930 IF (Y<1)+(Y>8) GOTO 920
940 INPUT "SECTOR COLUMN: " Z; IF Z=0 GOTO 280
950 IF (Z<1)+(Z>8) GOTO 940
960 RETURN
```

```
.END GAME MESSAGES
```

```
970 PRINT "OUT OF TIME!!"; GOTO 990
990 PRINT "GAME OVER."
```

4 - SENSOR REPORT.

AN 8 BY 8 GRID OF THE CURRENT QUADRANT:

* ARE STARS.

B IS A STARBASE.

K ARE KLINGONS.

E IS THE ENTERPRISE.

5	=	STATUS	REPORT.
---	---	--------	---------

TO SPEED PLAY, THE SENSOR AND STATUS REPORTS ARE OPTIONAL, UPON-REQUEST DISPLAYS.

AN EXTENDED VERSION IS AVAILABLE FOR \$1.50 ON YOUR CASSETTE, \$3.50 ON MINE. WITH A S.A.S.E. TO:

BILL ANDRUS

7034 THOMAS DRIVE

NORTH HIGHLANDS, CA 95660

Line #

Statement(s)

Comments



```

20000 . RESEQUENCING BY
      RON SCHWEITZER
20010 N=0; @(0)=%(-24576)
20020 FOR A=-24574 TO A+1796-SZ; I
      F %(A)÷256#13NEXT A
20030 N=N+1; A=A+2; @(N)=%(A); NEXT
      A
20040 INPUT ".START NO"O,".SPACI
      NG"G::PRINT
20050 PRINT;PRINT;PRINT ".FRO
      M LINE","#0,0," TO LINE",
      (N-1)×G+0," STEP",G;PRINT
      ;PRINT
20060 M=0;GOSUB 20120;FOR A=2457
      4 TO A+1796-SZ;TV=%(A);B=%(
      A)÷256;IF (RM=13)+(RM=-243
      )GOSUB 20120
20070 IF (RM=110)+(RM=111)GOSUB
      20090
20080 NEXT A;PRINT;PRINT;PRINT
      ":RETURN;NT=0";RETURN;N
      T=0;STOP
20090 T=0;FOR B=ATO A+5;IF (%(B)
      ÷256-53)÷6=0T=T×10+RM+5;A=
      A+1;NEXT B
20100 FOR B=0 TO N;IF @(B)=TPRINT
      #0,B×G+0;;RETURN
20110 NEXT B;RETURN
20120 PRINT #4,M×G+0;;TV=32;M=M+
      1;A=A+2;RETURN

```

USE OF SHADED AREA IS FOR 2ND OR
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Line #	Statement(s)	Comments
20000	.RESEQUENCING BY	
	RON SCHWEITZER	
20010	$N = \phi; @(\phi) = \%(-24576)$	
20020	FOR A = -24574 TO A + 1796 - SZ;	
	IF $\%(A) \div 256 \neq 13$ NEXT A	
20030	$N = N + 1; A = A + 2; @ (N) = \%(A);$	
	NEXT A	
20040	INPUT ".START NO"0,".	
	SPACING"G"; PRINT	
20050	PRINT; PRINT; PRINT".FROM	
	LINE", # ϕ , 0, "TO LINE	
	", (N-1) \times 6 + 0, "STEP", G;	
	PRINT; PRINT	
20060	$M = \phi; \text{GOSUB } 2\phi 12\phi; \text{FOR } A =$	
	24574 TO A + 1796 - SZ; $TV = \%(A)$	
	; $B = \%(A) \div 256$; IF (RM = 13) + (RM	
	= -243) GOSUB 2 $\phi 12\phi$	
20070	IF (RM = 11 ϕ) + (RM = 111) GOSUB	
	2 $\phi\phi 9\phi$	
20080	NEXT A; PRINT; PRINT; PRINT	
	" : RETURN; NT = ϕ ; RETURN; NT = ϕ	
	; STOP	
20090	$T = \phi; \text{FOR } B = A \text{ TO } A + 5; \text{IF } (\%(B)$	
	$\div 256 - 53) \div 6 = \phi$ $T = T \times 1\phi + RM + 5;$	
	$A = A + 1; \text{NEXT } B$	
20100	FOR B = ϕ TO N; IF $@(B) = T$	
	PRINT # ϕ , B \times 6 + 0, ; RETURN	
20110	NEXT B; RETURN	
20120	PRINT #4, M \times 6 + 0, ; TV = 32;	
	M = M + 1; A = A + 2; RETURN	

RESEQUENCING by Ron Schweitzer

This program will renumber a BALLY Basic program and print the renumbered program on tape. It will fix "GOTO" and "GOSUB" as long as they are not computed, i.e. "GOSUB C", the C will not be changed. However a "GOSUB 120+C" will be changed if there is a line number 120. It is slow but still faster than editing. This program is 473 bytes long as written here but can be shortened to.....426 bytes by deleting Line 20000

377 bytes by above and deleting Line 20050

366 bytes by above and changing Line 20040 to INPUT "FL#";FL#;PRINT

349 bytes by above and changing Line 20080 to NEXT A;PRINT "RETURN";STOP
This program requires a "Q(X)" for every line in storage. The resequence program is renumbered along with the object program. Spacing between the two programs can be accomplished by adding some dummy lines after the object program.

Notes on Ron's Resequencing Program by R. M. Houser

First key in the program of the byte length that you want. Then dump this on a cassette and plan on saving it. Now RESET the BALLY, and load the object program into memory from its tape. When finished loading load the resequencing program after it. This can only be done if there is enough memory space and you do not have conflicting line numbers.

Now add Line 1 GOTO 20000 (GOTO 20010 if 20000 has been deleted per above)

Now push WORDS RUN GO and the CRT will show "RUN". After a short wait.....

The computer will ask for "START NO" put in 0, this will automatically set "FL#"

and ^{next} rid of "GOTO 20000 or (20010)" later on, and make the first line be 0+Spacing.

At this time start the tape recorder with a new tape to load the renumbered program on. The computer will now ask for "SPACING" enter the spacing you want. ".SP"

You will now see the object program be renumbered on the CRT, when you see that the renumbering has reached the resequencing program stop the tape recorder. This will save you having to delete the resequencing program later.

NOTE! The program stored in the BALLY memory is still the old line numbered ~~per~~ programs. The renumbered program is on the tape. So now RESET the BALLY and load in the renumbered object program. At the beginning there will be some garbage but it will drop out when the program is run or listed. Now list the program and then delete whatever remains of the resequencing program. Now load the renumbered program on a clean cassette. If you have long programs two passes will be necessary and some of the "GOTO" and "GOSUB" will have to be edited.
THANKS FOR THIS PROGRAMRON

Received all of the above on two tapes. Neither tape would load into my machine as readable progrms until I rerecorded them with another tape player into my tape player.

UFO BATTLE- Game has great sound effects and screen changes. the explosions are the key to this program. Do not cheat by keeping TR(1) pulled. I did and ended up with a score of 29,853 on the third try!!!

DOWN THE TRENCH- In my opinion this is the best of the games. The program demands dexterity, perseverance and concentration to succeed in the mission. Outstanding sound and 3D graphics. A very good program utilising the memory of the BALLY.

HIT THE PEDESTRIAN- Another 3-dimensional game to keep you on your toes. The man falls apart if you move KN(1) to fast. Make the below changes and you will stop this situation and have about 200 bytes left or 11% of the memory to improve the sound or graphics

```
205 Q=1000;GOSUB Q
```

210/530 change all lines with BOX KN(1);2+M,-,-,-,- to read
BOX Z(+or- if called for),-,-,-,-

290, 375, 452, 490 change to CLEAR ;GOSUB Q

```
1000 Z=KN(1)/2+M:RETURN
```

SUBMARINE MINEFIELD- Moving the sub through 230 mines is tricky and if you add 3 depth charges or scanning mines you have lots of problems. This one has a realistic sea bottom that is alive with creatures (the stack being manipulated causes this illusion). Find 14 bytes and change line 52 to read BOX 0,40, 160,1,1;FOR A=1TO230 to show sea level. IF PX(-,-) described in Oct. ARCADIAN was used to detect for mines.

MUNCH- This one is full of suspense. It has enough memory left to add a search routine to check that at least one bit is removed from the screen or to subtract points from the player.

SUPER WUMPUS- If you have never hunted Wumpi, then try this game. Excellent use of different sound effects and use of dual sound effects are unique. This program has two listings. The first is to instruct the player and the second is the game. This saves the memory for the many branches, subroutines and sound effects.

MATH ROUTINES- For 3-dimensional graphics. This program calculates sine, cosine and arctangent more than accurate enough for the integer basic of the BALLY. The square root has a fast and a slow version depending on the accuracy needed.

SUMMARY- All programs come with listings and complete documentation. They use all of the functions of the BALLY BASIC and have several unique sound effects. Instructions are duplicated in listing at program and this uses up memory which could be put to better use.

Richard De Forest

Richard D. Lovett